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Some Clinical Diagnostic Methods of Use in Conditions Associated with Animal Parasites*

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INTRODUCTION

Many different techniques and their modifications have been designed for the various classes of material submitted for laboratory examination and it would be impossible to give you a detailed description of each method in the time available this afternoon. So I intend to describe mainly the techniques which we use at the Research Institute in Animal Pathology and to refer only very briefly to other methods or their modifications which are used elsewhere.

It may sometimes, and indeed very often does, seem to the average student that the parasitologist places too much stress upon identification of parasites and upon the details of their morphology. There is, however, some reason for this apparent peculiarity of parasitologists, because morphologically similar parasites may vary considerably in their pathogenicity. Parasitic gastritis of cattle and sheep generally results from a mixed infection of worms and it is very important to know which species are present, not only because of their differing pathogenicity but also because of their varying responses to anthelmintic treatment, *e.g.*, phenothiazine has been found to be practically 100 per cent. effective against *Haemonchus contortus*, including the immature worms, in sheep. The other sheep parasites have been classified in their order of decreasing susceptibility to phenothiazine as follows: *Ostertagia* spp. and *Trichostrongylus axei; Cooperia*, the other *Trichostrongylus* spp. and *Bunostomum*; *Chabertia ovina* and *Oesophagostomum venulosum; Strongyloides* and *Trichuris; Nematodirus* and *Moniezia* (Anon., 1943).

The point I wish to make is that it is just as useless to diagnose ascariasis as a "parasitic infection" as it is to refer to conditions such as tuberculosis, Johne's disease or contagious abortion as "bacterial infections."

HELMINTHS

To determine the presence of helminths in an animal a faecal examination is generally necessary. The exceptions include those helminths whose eggs are passed in the urine and others whose normal habitat lies outside the alimentary tract; although even in the latter case evidence of infection may be found by examination of the faeces, *e.g.*, lungworm, whose eggs are coughed up, swallowed and hatch during passage through the alimentary tract so that first stage larvae can be found in the faeces.

Faecal Examination

A macroscopical examination of faeces is usually neglected, although it may be of some help, for whole parasites or their fragments may be found, or segments, in the case of taneworms.

A microscopical examination can be a very valuable aid to the diagnosis of helminthiasis provided certain limitations and disadvantages are borne in mind.

The direct smear is the simplest and cheapest of all microscopical methods. A small particle of faeces is placed on a slide and mixed with a drop of water or normal saline and examined under a cover glass. Heavy infections may be detected from a single examination, but light infections will be missed unless repeated preparations are examined. For this reason the common routine method of detecting parasitic infections involves the use of some concentration method.

One of the earliest methods was to allow the faeces to settle, after washing, if necessary, and to examine the sediment. Then other sedimentation methods were introduced using fluids such as calcium chloride or a mixture of ether and hydrochloric acid. To give a more rapid and certain concentration of eggs a centrifuge was then used. Further modifications involved the use of a fluid of slightly higher specific gravity than the eggs, so that the latter floated to the surface whilst the solid debris sank to the bottom, again using a centrifuge to hasten the process. Various fluids have been used for this purpose, including saturated salt or sugar solution, calcium chloride, sodium acetate, zinc sulphate, glycerine, and water glass.

The actual method which we use in the laboratory is as follows: A small quantity of faeces is put into a centrifuge tube and sufficient water to make a thick suspension is added; the quantity required naturally depends upon the amount of moisture in the specimen. The mixture is then thoroughly shaken to obtain an even suspension. Saturated sugar solution is added to the top of the tube, which is inverted three or four times and centrifuged at 1,500 r.p.m. for about two minutes. By applying a glass rod, with a specially "headed" flat end, to the surface of the liquid in the tube, a sample drop is transferred to a glass slide, or a small circular coverslip can be placed in contact with the surface of the fluid and removed with special forceps. The resultant drop is examined on an ordinary microscope slide. The preparation is examined with a 2/3 objective and a × 10 eyepiece.

Recently two American workers, Eigenfeld and Schlesinger (1944), devised a special tube with a side arm. Faeces in brine, zinc acetate or other flotation solution are placed in the tube almost up to the side arm level. When the eggs have had time to float to the surface sufficient flotation fluid is added by means of a funnel, whose stem reaches to the bottom of the tube, to allow 2 to 4 c.c. of the surface layer to spill over into the side arm where they are caught in a centrifuge tube. Then distilled water is added to the suspension in the centrifuge tube, which is then spun for a few minutes and the sediment examined for eggs. In this way the maximum number of eggs is obtained.

The direct centrifugal flotation methods have the advantage that they are quick and efficient even in very light infections, but they are only applicable to the detection of nematode eggs and coccidia, for operculate eggs of trematodes and some cestodes will not float to the surface, because they either burst or sink; in such cases the sediment must also be examined.

These, however, are qualitative tests for the presence or absence of eggs, and while they may give some idea of the degree of infection they are, in this respect, very inaccurate.

To obtain a quantitative estimation of the degree of infection there have been devised various egg counting methods, most of which are based upon the Stoll dilution technique. Great confusion has occurred in the past by the use of more than one method of stating the end-result. Thus, some workers gave the number of eggs per gramme of faeces, others the number of eggs per ounce of faeces, and still others the number of eggs per microscope field. Nowadays eggs per gramme is the most widely used standard to express the result of a faecal count. For routine purposes we have found the following modification of Stoll's technique to be the most satisfactory:—

1. Weigh out accurately 5 grammes of faeces and place in a wide-mouthed flask marked at the 75 c.c. level.
2. Add enough N/10 Sodium hydroxide solution to reach the 75 c.c. mark. (This helps to break up the mucus.)
3. Close with a rubber stopper and shake thoroughly to get an even suspension. We usually prepare a sample and leave for several hours or overnight, shaking at intervals to obtain a uniform suspension. Sieving is sometimes recommended in the case of faeces containing large particles of straw but as the eggs as well as debris may be held back we do not generally use a sieve. (Small glass beads may be added to the suspension to facilitate mixing when shaken, but the subsequent washing and drying of the beads increases the time and labour required and we do not consider them to be necessary—and they may knock the bottom out of the flask if shaken vigorously.)
4. When ready to make the count, again shake the flask well and immediately withdraw 0·15 c.c. of the suspension by means of a graduated pipette and transfer the sample to a glass slide.
5. For convenience spread the preparation out with a mounted needle over an area of about an inch square; no cover slip is necessary.
6. Using a mechanical stage count every egg and multiply the result by 100 to obtain the number of eggs per gramme. The average of three or four counts should be taken.

As I have already said, this method is designed for a quantitative

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estimation and not for diagnostic purposes. Thus it may fail to indicate a very light infection, *e.g.*, less than 100 eggs per gramme.

A new technique was introduced by Gordon and Whitlock (1939). This method involves the use of a slide having special counting chambers. A watery faecal suspension is mixed with a flotation fluid, so that the eggs float up and lie against the under surface of a glass slide, which forms the top of the chamber, and are thus all in the same focus while the debris is out of focus on the floor of the chamber. This method—the McMaster Method—obviously simplifies counting because there is no débris obscuring the eggs and the time required for each count is much reduced. A comparison of results obtained by a modified Stoll dilution technique and a modified McMaster technique has shown that the latter gives higher counts and less variability and is about three times as rapid as the former. As judged by comparison with counts of eggs concentrated by sugar flotation it was not possible to decide which was the more accurate method. (Peters and Leiper, 1940.) It is of great value for egg counting involved in research work, but we have not adopted it for routine purposes because we have to examine faeces sent in from all species of animals and if fluke eggs were present they would not be detected because of their inability to float to the surface.

The actual routine method we use with all samples of faeces received at the laboratory is first to examine preparations made by the sugar flotation centrifugation method, to get an idea of what eggs or oöcysts are present and to follow this, if necessary, with a count made by the modified Stoll dilution technique. Factors which may influence the count must always be borne in mind when attempting to interpret the significance of egg counts. One of the constant shortcomings is that, in an acute infestation with young worms which have not reached sexual maturity, eggs will not be present in the faeces. This was impressed upon me some time ago when I had to examine faeces from a 5-months-old filly foal with an obscure illness of about five weeks' duration. There had been intermittent attacks of scouring for some weeks and it was not until the temperature was taken and found to be 105·5° F. that any serious notice was taken of the diarrhoea. The scouring ceased about a month before death, but the temperature continued to fluctuate. During this time the question of pyaemic nephritis was considered; bacteriological examination of the urine revealed nothing of significance. A few days before death the presence of redworm infection was considered; an examination of the faeces was made and a moderately heavy ascarid infection was found, but no strongyle eggs were detected. However, at *post-mortem* examination very large parasitic aneurysms containing many strongyle larvae were found in the anterior mesenteric artery and its branches. The point is that the condition was missed during life because no strongyle eggs were found on faecal examination. The probable explanation is that the female worms had not reached the egg-laying stage, which in this species is generally considered as being about 12 weeks after oral infection.

Other factors which may influence the interpretation of faecal examinations are the water content of the faeces, *e.g.*, diarrhoeic faeces may contain about five times as much moisture as normal faeces and the egg count may be correspondingly decreased; the nature and amount of the food—bulky food increases the volume of faeces and causes a diminution in the egg count; administration of oily substances such as castor oil which may float on the surface of the faecal preparation and obscure the eggs; the general bodily condition of the animal, *e.g.*, in bowel stasis the count may be increased five or six times; the age and resistance of the host, *e.g.*, in resistant animals the egg output of female worms may be considerably depressed; the egg laying capacity of particular species, *e.g.*, ascarids have an enormous egg output and a large number of eggs in the faeces may result from only one pair of adults in the intestine; eggs of accidental parasites which have been picked up by the host may be passed out unchanged in the faeces. Tapeworm eggs may be passed within the segments and will not be found in faeces. A number of foreign objects are sometimes present and may be confused with eggs of worms—coccidial oöcysts, pollen grains and the eggs of forage mites are among the commonest and most deceiving. Experience gained from making weekly egg counts over a long period of time has shown that individual counts do fluctuate quite considerably even in the absence of any apparent changes in external conditions. However, despite these limitations, egg counts can be of great assistance in arriving at a diagnosis of helminthiasis in young animals and at the present time they provide the only available standard. Taylor (1939) has studied the clinical significance of egg counts and he has suggested the following figures as borderline limits, *i.e.*, counts below the minimum figure are probably of no clinical significance whilst figures above the maximum indicate a heavy infection.

Parasitic gastritis in lambs	...	2,000 to 6,000 E.P.G.
Parasitic gastritis in cattle	...	300 to 600 E.P.G.
Equine strongylosis	... ...	1,500 to 2,500 E.P.G.
Fascioliasis in sheep	... ...	300 to 600 E.P.G.
Fascioliasis in cattle	... ...	100 to 200 E.P.G.

You may think I have stressed the difficulties and uncertainties which detract from the usefulness of faecal examinations in the diagnosis of helminth infections. While appreciating the value of these aids and while using them to the greatest advantage, one must be careful to keep the proper perspective and avoid the tendency to regard the results of faecal examinations as the beginning and end of the diagnostic procedure. Symptoms, case history and other relevant information should be obtained from, or, more properly, given by the person requiring the faecal examination, since the laboratory worker making the egg count is often in no better position to make a diagnosis than is the man in the field who collects the samples for examination and sees the animals and their environment. This prompts me to remind you that faeces which are to be submitted to a laboratory should be sent in a tin or jar with a firmly fitting lid. A reasonable quantity is at least six or seven grammes so that a qualitative and a quantitative examination may be made. We frequently receive from laymen as well as veterinarians, samples which have been despatched in newspaper or match boxes, and which, according to their original consistency, may or may not be in a suitable state for examination after perhaps two or more days in transit.

Post-mortem Examination

A definite and accurate diagnosis of *parasitic gastritis* of cattle and sheep can be obtained by making an estimation of the total number of worms present in the abomasum and intestines at *post-mortem* examination. Information as to the extent of infestation is particularly valuable in the case of adult animals "whose immunity lowers the rate of egg production and renders the egg count quite unreliable as a guide to the number of parasitic worms present" (Taylor, 1934). Even in resistant lambs the number of eggs produced may be much less than in susceptible lambs, and therefore an egg count may give an entirely false picture of the actual degree of infection. Thus an estimation of the total worm burden and of the species involved is of great importance.

The method which we adopt is as follows: The abdomen is opened, the omasum and rectum are tied with string and the fourth stomach and intestines are removed and placed on a tray. The abomasum is tied at its duodenal opening and is then removed, opened, and its contents tipped into a bucket of formol saline. The stomach wall is carefully washed under the tap and the washings are added to the rest of the contents in the bucket. The small intestine is then tied off at the ileocaecal valve and removed to a tray where it is gently torn away from its mesenteric attachments. The contents are then squeezed out into another bucket of formol saline. The large intestine is generally slit from end to end to facilitate removal of the more bulky contents and also to recover any whipworms which may be adhering to the wall of the caecum. The whole contents are likewise tipped into another bucket of formol saline, the walls of the caecum and colon are washed under the tap and the washings are added to the contents of the bucket. The contents of each bucket are then washed repeatedly by sedimenting and decanting the supernatant fluid until the material is clean enough to examine. This sedimentation process is most easily carried out if the contents are transferred from the buckets to urine jars. When sufficiently clean the contents are tipped into a measuring cylinder and water is added to bring the total volume to, generally, 1,000 c.c. Whilst the contents are stirred vigorously samples are withdrawn by means of a wide-bore pipette. Usually a 50 c.c. sample (*i.e.*, 1/20 of the whole) is first taken, and all the worms are picked out individually and counted; a binocular low-powered microscope is used for the smaller gastro-intestinal worms. If very few worms are found in the first 50 c.c. further samples are taken until a representative number of worms has been counted. The various counts are then added together and the total number of worms in the abomasum, or small, or large, intestine computed. Thus, if from the abomasum three 50 c.c. samples have been searched for worms from a total of 1,000 c.c. this would represent 3/20 of the total worm burden of the fourth stomach.

In some cases, an estimate of numbers alone is sufficient evidence upon which to base a diagnosis of parasitic gastritis, but in view of the varying pathogenicity of these intestinal worms it may be advisable to identify the species involved. For this purpose 50 worms are picked out at random from a representative sample and five or more are mounted in a drop of water on a slide. With a little practice the males can be rapidly differentiated owing to the specific features of their spicules. Some females, however, are not easily separated from others in the same genus, and so they are usually added together and the total is divided proportionately

to the number of males, on the assumption that the various species of females are present in the same ratio as the species of males. Taylor (1935) compiled a very useful key which, with illustrations, indicates very simply the main characters upon which species differentiation may be made.

The interpretation and significance of these results for the clinician may be illustrated by some examples of total worm counts given by Oldham (unpublished work):—

	Goat A.	Goat B.	Goat C.
Final count E.P.G. ...	2,360	8,800	47,700
Total worms	42,434	56,355	12,141
No. of female worms ...	28,774	36,334	8,806

These figures are quoted only as examples and are in no way intended to represent standard limits.

Lungworm Infection

I have discussed the diagnosis of parasitic gastritis at some length, because it is probably the parasitic disease of greatest economic importance in this country, but before I leave the group of helminths there are a few additional points I should like to mention, and the first of these is the diagnosis of lungworm infection. Although lungworm larvae may be detected by flotation technique a more satisfactory method is by means of the Baermann technique. A glass funnel, with a short length of rubber tubing over the stem and closed by a clamp, is fixed in a stand. The sample of suspected faeces (as fresh as possible) is wrapped in a square of cheese cloth and supported on a wire gauze tray in the funnel, which is then filled with water at 37° to 40° C. Under the influence of warmth the larvae actively leave the faeces and drop to the bottom of the funnel. After one to two hours a few c.c. of water are drawn off into a watch glass and examined for larvae.

Faecal Culture

For special purposes, such as the differentiation of some strongyle larvae which cannot be identified from the eggs, a method of faecal culture is sometimes used. This is quite simple and merely involves crushing some faeces in a glass jar, adding a little water if the faeces are very dry, but not enough to make the mass sodden. The jar, which should not be more than a third full, is then covered with a loosely fitting lid and placed in a dim light at room temperature in summer or incubated at about 25° C. in winter. Assisted by the film of moisture which condenses on the inside of the jar, the larvae migrate up the walls and are easily isolated by simply washing them out of the jar into a petri dish. Charcoal may be mixed with the faeces if they are very diarrhoeic. Some strongyle larvae appear after four to seven days but *Strongyloides* may be found within two to three days.

Preservation of Parasites

I feel it might be helpful to give you a few hints on the collection and preservation of parasites, not only because these operations are quite simple and can be carried out easily in clinical practice without any elaborate laboratory equipment, but also because we, in the laboratory, often receive specimens in descending degrees of decomposition until the stage is reached when they are beyond identification—and so I hope a nod will be as good as a wink to a blind man (or woman). Examination of helminths is best made in the fresh state, but as such examination usually has to be carried out some time after collection, the parasites must be fixed. In most cases the best fixatives are hot 5 per cent. formalin, 5 per cent. formol saline, or 70 per cent. alcohol. For storing, a solution of 70 per cent. alcohol (95 parts) with glycerine (5 parts) is used. Helminths should never be stored in commercial methylated spirit.

Protozoa

Coccidia

The commonest protozoa with which we have to deal are coccidia. Oöcysts in the faeces are easily detected by the methods already outlined for helminth eggs. A diagnosis of coccidiosis, however, is not such a simple matter, because most normal healthy animals and birds have been found to harbour coccidia. Thus the mere finding of some oöcysts in suspected faeces is not sufficient justification for a diagnosis of clinical coccidiosis. We believe that, unless there are more than 40 to 50 oöcysts per microscope field, the diagnosis is doubtful. Because the shedding of oöcysts occurs in regular cycles it may be that at the time of examination the mature stage of the parasite has not been reached and oöcysts will not be found in the faeces. If an examination is made *post-mortem* a definite diagnosis may be obtained by preparing frozen or paraffin sections of portions of the intestine to detect damage to the epithelial cells. This procedure is also advisable when one wants to ascertain whether oöcysts found at faecal examination are species actually parasitic in the animal in question or whether they have resulted from some other animal or bird which has been eaten—although this would occur only in the case of a carnivorous host.

From the clinical aspect, species or even genus differentiation of coccidia is not generally required. Recently, however, Boughton (1943) carried out experimental trials with sulphaguanidine in bovines and found that this drug had a selective action on certain species of coccidia affecting cattle. So, as a greater range of drugs comes into use against coccidiosis it may be necessary to identify the species concerned. In the laboratory this identification is of more frequent occurrence and cultures are prepared by spreading faeces in a petri dish and covering with 2 per cent. potassium bichromate solution, 1 per cent. chromic acid or 1 per cent. formalin to inhibit bacterial activity and to allow sporulation of the oöcysts. Sometimes it is necessary to free the parasites from excessive numbers of bacteria present before adding the culture solution. For this purpose they are washed several times by centrifuging and decanting the supernatant fluid, or, alternatively, oöcysts which have been floated up are transferred with a platinum loop to a small amount of culture fluid. The culture is kept in a petri dish and the fluid should not be over ¼-inch deep to allow adequate aeration. The length of time required for sporulation at room temperature depends upon the species and varies from 24 hours or even less up to a week or more. The oöcysts, sporocysts and, if necessary, the sporozoites are then measured by means of a micrometer eyepiece or, better still, by drawing the objects with the aid of a camera lucida and projecting on to the drawing paper the micrometer scale through the same system of lenses.

As I have already pointed out, it is not always easy to determine whether a condition of coccidiosis exists or not by the ordinary centrifugal flotation methods and until recently there has been no standard quantitative method comparable with those used for helminth eggs. Beach (1943), however, has worked out a method which is essentially an adaptation of the procedure for counting blood cells. A faecal suspension is prepared with 5 per cent. NaOH and a special counting chamber is used.

Trichomonas

It is much more satisfactory to make a positive diagnosis of *Trichomonas foetus* in the field than to send material to a laboratory for diagnosis, because if there is delay in transit the trichomonads may be immobile or dead on arrival. Even in fresh material, however, trichomonads are by no means always easy to find because the number of parasites varies during the course of the disease, and they may not be present in the discharge or secretion at the particular time of examination and if few in number they may be entirely missed.

The simplest method of detection is by examination of a wet preparation made from fresh material when the trichomonads, if numerous, cannot fail to be seen owing to their characteristic jerky movements. It is quite useless to attempt to detect dead trichomonads in a wet film. When, at the laboratory, we receive suspected material which has been collected more than about twelve hours previously and has become quite cold, we add a little normal saline and incubate it at 37° C. for several hours before examination.

If direct methods fail to demonstrate the organisms, cultures in simple media consisting of egg slopes covered with saline are put up and examined after 24 to 48 hours, when maximum growth should have occurred. It has recently been found that a much more certain and reliable diagnosis of trichomoniasis in a herd rather than in the individual animal can be made by means of an agglutination test. Kerr and Robertson (1941) tested the sera of a number of animals and concluded that if one animal with a definitely positive reaction is found in a herd it is an indication of a serious *Trichomonas* infection, whether the organism can be found or not. Not all infected animals, however, react to the test, which is said to give an "over-all result" of 60 per cent. (Kerr, 1943).

Fixed and stained preparations are not entirely satisfactory but they are sometimes required to differentiate *T. foetus* from *T. ruminantium*, which is normally present in the rumen and may be present as a contaminant. Trichomonads are best stained, after moist fixation in Schaudinn's fluid or osmic acid vapour, with Giemsa's stain, May-Grünwald-Giemsa, or by Heidenhain's iron haematoxylin.

T. foetus may be found in vaginal secretions following early abortion, in discharges in chronic endometritis and pyometra, in preputial secretions and, in the case of an aborted foetus, in the mouth, stomach contents, and at the base of the tongue (Case and Keefer, 1938).

Blood

The most important parasitic disease in this country for which blood films are examined as a routine procedure is redwater. Films may be stained with Giemsa's or Leishman's stain. Using the Giemsa method, films must first be fixed in methyl alcohol for three minutes or longer. They are then

stained for about half an hour in a solution consisting of one drop of Giemsa stain to 1 c.c. distilled water. It is most important to use distilled water which is neutral in reaction; it can be tested by adding neutral red or phenol red as an indicator. Usually it is definitely acid and it is then neutralised with 1 per cent. lithium carbonate until the characteristic yellowish pink colour appears. After staining, films are washed thoroughly in distilled water until they appear pinkish. They are then dried rapidly in the air.

When Leishman's stain is used previous fixation is unnecessary because the stain is made up with methyl alcohol. Thus the stain is poured on to the films and left for 30 seconds. Then twice the amount of distilled water is added and left for 15 to 30 minutes. The films are then washed in distilled water and air dried.

I, personally, find that the panoptic staining gives the most uniform results and I use it as a routine method for all blood films or smears of material containing protozoa. Air dried films are fixed for three minutes in May-Grünwald. An equal quantity of distilled water is then poured on and staining continued for one minute. This solution is poured off and the films are next stained in Giemsa solution in a dilution of 0·3 c.c. in 10 c.c. distilled water for 10 to 15 minutes. They are then washed in distilled water, dried and examined.

From time to time intestinal protozoa occur in faeces and a simple way of detecting them is to mix a drop of iodine solution with a particle of faeces on a slide until a yellowish suspension is obtained. On examination protozoal cysts such as amoebae will be found to stain light brown and their nuclei will stand out very clearly as almost black bodies.

Arthropod Parasites

A few words on the collection and preservation of arthropods may be of some use because we sometimes receive for identification specimens which are either dried up or otherwise so damaged that it is quite impossible to make out the necessary details of their structure.

Specimens for dry mounting, like adult flies, are killed by placing them in a wide-mouthed bottle containing a freshly made paste of potassium cyanide and plaster of paris, which is covered with a few layers of blotting paper. Strips of paper placed in the bottle will prevent insects clinging together and so damaging their appendages. They can then be pinned out on boards or in boxes.

Dipterous larvae, lice, fleas, or mites can be fixed and stored in 70 per cent. alcohol or 10 per cent. formalin, whilst ticks can be preserved in their natural colours by dropping them alive into a 10 per cent. solution of formalin (made up with distilled water) just saturated with chloroform (Monnig, 1938).

Skin scrapings from suspected mange lesions are examined by boiling the material in 10 per cent. KOH for a few minutes until the hairs and larger debris are broken up. The material is then centrifuged, the supernatant fluid is decanted off and the sediment is examined microscopically, or a flotation fluid may be added after decanting and on centrifuging the mites will float to the surface. If few hairs and only little debris are present the material can be cleared in clove oil or creosote and examined directly.

When individual mites require to be mounted we prefer to use Farrant's medium, a mixture of gum arabic with glycerine in water (picked gum arabic 4 oz., water 4 oz., glycerine 2 oz.), because media such as Canada balsam usually clear the mites too much and after only a short time it is impossible to make out details of their morphology. Also, as Farrant's is a watery medium, mites may be mounted directly from water or KOH solution without first being dehydrated.

Fleas, lice, and ticks must, in general, be mounted before they can be accurately identified. Many methods have been tried and each involves some process of "clearing" with caustic potash and carbolic acid (Bedford, 1932), turpentine (Davidson, 1941), or oil of cloves (Bedford, 1932) to render the chitinous parts sufficiently transparent.

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Discussion

In opening the discussion, Mrs. Kelly said she wished to congratulate Miss Bingham on her most interesting paper, which covered such a wide and important field, and continued: I agree with the essayist that the identification of parasites is extremely important, otherwise a wrong diagnosis may easily be given. It is not true that the presence of a few helminths or their eggs in the faeces of an animal that is scouring necessarily indicates parasitic gastritis. Some of the strongyloides (whose pathogenicity is still unknown, according to Cameron, 1934) are very prolific. Is it difficult to distinguish these eggs from the more pathogenic members of this family without doing a larval culture?

Taking the protozoa, the essayist states that the oöcysts of coccidia are easily recognised in the faeces. Perhaps for an expert this is so, but some vegetable spores are rather confusing. An early diagnosis of coccidiosis often is very difficult, for it is only after the coccidia are producing their sexual cycle that the oöcysts appear in the faeces, not during the acute stage. With the larger animals it is not always possible to have one slaughtered to do a *post-mortem* examination, and even though death has occurred it is not always easy to demonstrate the oöcysts in the epithelial cells of the intestine. Whilst on the subject of coccidia, I should be very grateful to know how *Eimeria zurnii* of bovines can be identified.

It was a good point the essayist made about the advantages of making a wet preparation from fresh vaginal material for *Trichomonas*. If the material is several hours old, and movement of the organisms has ceased, the undulating membrane may often be seen, however, with a little experience, without staining, to show slight movement that is typical, especially after warming for a short time. It is stated that if the sera of one animal in a herd gives a definitely positive reaction it is an indication of serious general *Trichomonas* infection whether the organisms can be found or not. Has Miss Bingham found this to be true and has she had any experience of the intradermal tricin-test, which Mr. Kerr discussed at the recent meeting of the North Wales Division?

Two other parasites of economic importance to the farmer occurred to me which have not been mentioned, the sheep "blowfly" and the two warble flies, *Hypodermis bovis* and *Hypoderma lineatum*. I should be interested to know more about the distribution of *H. lineatum*; it is not prevalent in Cheshire.

Forage mites may confuse the picture when looking for chorioptes from horses with "itchy" legs; how does one distinguish them?

I hope that a good discussion will follow on this very important subject which Miss Bingham has so aptly presented in her paper.

Reference.—Cameron, T. W. M. (1934.) The Internal Parasites of Domestic Animals. A. C. Black, London.

Miss Joshua said that she had recently had a case of suspected *Histomonas* infection in a fowl and asked how the diagnosis could be confirmed. Also she wanted to know why phenothiazine was not recommended for dogs. Was it because it was ineffective or toxic?

Miss Uvarov asked what were the criteria which determined the stage at which pathogenic effects were produced. Was it possible to distinguish strongyle eggs from each other? In view of the speaker's remarks about the question of clinical coccidiosis, when and on what grounds could a diagnosis be made? Could the speaker give any more information on the results of the agglutination test for trichomonisis, because an over-all result of 60 per cent. did not seem very satisfactory?

Miss Bentley asked what number of Ascarid eggs per gramme of faeces would indicate a condition of canine ascariasis.

Miss Brancker asked whether the sediment should be examined as well as the surface fluid, when examining cattle faeces by flotation methods, if liver fluke was suspected.

The Reply

Miss Bingham, replying to points raised by Mrs. Kelly in opening the discussion, said that, generally speaking, *Strongyloides* spp. were not considered to be very pathogenic. Their eggs were quite easily recognised on account of their small size, and the presence of a fully developed embryo when passed in the faeces.

Eimeria zurnii was usually the smallest oöcyst found in cattle faeces and the majority were spherical in shape. She was very interested to hear of the introduction of an intradermal test for the diagnosis of trichomoniasis, and looked forward to reading Mr. Kerr's paper on Trichomoniasis, given to the last meeting of the North Wales Division.

To identify sheep blowfly larvae the cephalopharyngeal skeleton and anterior spiracle and the posterior spiracles must be detached and mounted on a slide. Forage mites could be distinguished from *Chorioptes* spp. which bore large pedunculated suckers on the legs in contrast to forage mites. The latter also had a well-marked constriction in the anterior part of the body.

In reply to Miss Joshua, with regard to diagnosis of *Histomonas meleagridis* infection, the flagellate forms might be found in the caecal contents. Histological sections of the liver lesions would reveal amoeboid forms, devoid of flagella, in the liver tissue.

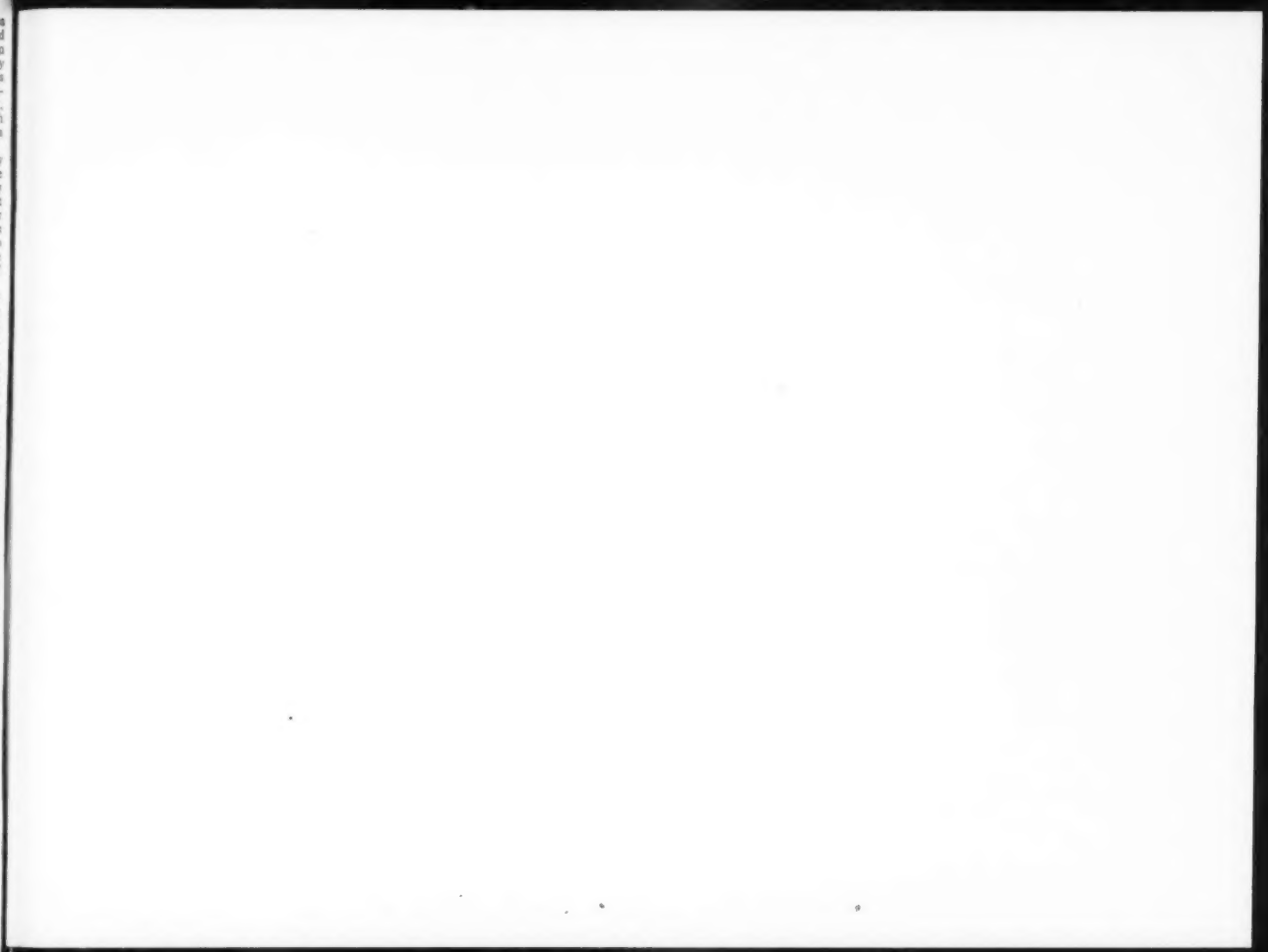
Most reports indicated that phenothiazine was of no value against ascarids of dogs.

In reply to Miss Uvarov, a determination of the actual stage when helminths might be said to have become pathogenic was sometimes extremely difficult to arrive at on the results of faecal examination, mainly owing to the various factors affecting egg counts, which had been already outlined. Numbers of worms, of course, played a large part, because, in some cases, normally non-pathogenic forms would only become harmful in large numbers. It was very difficult to identify some strongyle eggs of cattle and sheep nematodes, but recently (Kates, K. C., and Shorb, D. A. (1943.) *Amer. J. vet. Res.* 4 (10). 54-60) there had been published characters and measurements upon which even these eggs might be distinguished. Miss Bingham thought that several examinations over a period of days might sometimes be required before one could be sure whether an actual clinical condition of coccidiosis existed or not, as there was no definite periodicity in the discharge of oöcysts, and in subacute or chronic cases the numbers of oöcysts shed might fluctuate.

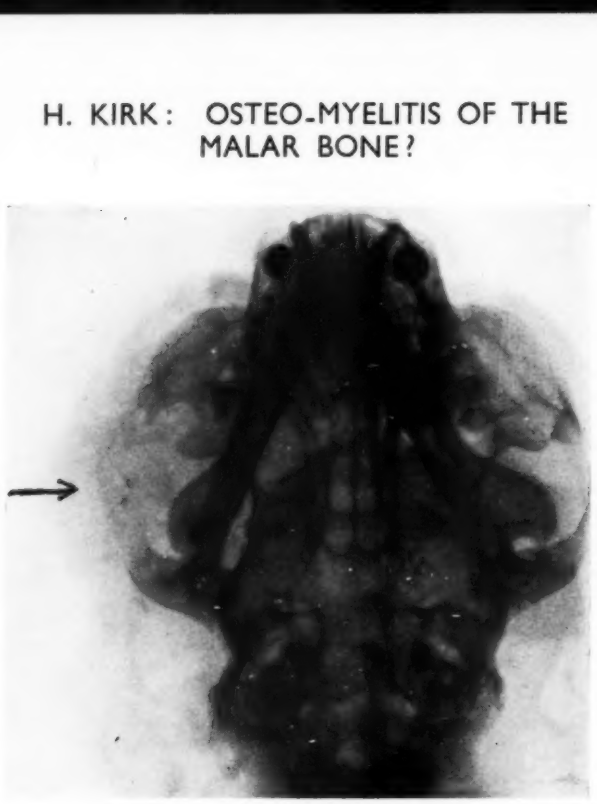
She had no practical experience of the agglutination test for trichomoniasis and could not add to the information she had already given from published reports.

Replying to Miss Bentley, Miss Bingham said that it was very difficult to decide upon what numbers of ascarid eggs in the faeces would indicate a clinical condition of ascariasis owing to the enormous egg-laying capacity of the females. The diagnosis was largely based upon the clinical picture in conjunction with a faecal examination.

In reply to Miss Brancker, when routine examination of ruminant faeces was made by flotation methods only, the sediment should also be examined for fluke eggs.



H. KIRK: OSTEO-MYELITIS OF THE MALAR BONE?



This radiograph was taken after the spicules of loose bone had been removed, and the swelling cleaned out.

CLINICAL COMMUNICATION

Osteo-Myelitis of the Malar Bone?

HAMILTON KIRK, M.R.C.V.S.
Finchley Road, N.W.11

A considerable swelling on the cheek of an 18-year-old cat was opened, as it was fluctuating and seemed to contain pus. The swelling had been present a fortnight, during which time the adjacent eyelids had been unable to close (probably because of involvement of the motor nerve supplying the orbicularis palpebraris) and the eye had remained open even during sleep.

The iris showed patchy changes in colour from green to brown on the side nearest the lesion.

Incision of the swelling revealed no pus, or any sign whatever of sepsis, but I was astonished to feel jagged edges of fixed bone, as well as small portions of removable bone, inside.

I was puzzled to know just what this condition could be, and at first considered the malar had been fractured. I radiographed the cat's head and submitted the film to a pathologist who thought the condition was one of osteo-myelitis.

In this disease one does expect to find considerable rarefaction of bone, but I would not have thought that discrete portions of bone would have detached themselves and been found floating about in the clotted blood and serum which filled up the cavity.

The original diagnosis of fracture was not upheld by one or two of my colleagues, and from a radiographic point of view the diagnosis seems to be osteo-myelitis. Unfortunately it was impossible to decide the question by *post-mortem* examination as the owner would not permit this.

The observations of readers would be welcomed.

REVIEW

[*Imperata Cylindrica*: **Taxonomy, Distribution, Economic Significance and Control.** Published by Imperial Forestry Bureau, Oxford, and Imperial Bureau of Pastures and Forage Crops, Aberystwyth. 1944. pp. 63. Obtainable from Imperial Agricultural Bureaux, Central Sales Branch, Agricultural Research Building, Penglais, Aberystwyth. Price 2s. 6d.]

"*Imperata cylindrica* is a grass species that is widely distributed in tropical and subtropical lands, especially in open country on abandoned cultivated land and in deforested areas, where it may be the chief ground for many miles. It is one of the most common grasses in Africa, stretching from the tropics southwards to the Union of South Africa and northwards to the shores of the Mediterranean. It is also found in Southern Europe and eastwards to Turkestan and Afghanistan, and is well known in India, Malaya, China, Japan and Australia." Five varieties of the grass are described.

It frequently appears as a weed in cultivated plots; its effects are nearly always adverse. The grazing and fodder value of *I. cylindrica* is low and it has very little value as a commercial source of fibre; the general conclusion is that it should be replaced where possible by superior grasses managed according to modern methods. Various methods of eradicating the grass are described, but it appears to be a difficult process.

Weekly Wisdom

"*It is idle for us farmers to think that we can slip back into peaceful ways and take along with us permanently our war-time prices and guaranteed markets unless we make a special effort to deserve and retain them. In the last resort the industry will be successful through the creative efforts of those who are engaged in it and those who are in a position to lead, direct, and assist it.*"—Sir Thos. Baxter (Chairman) at the annual meeting of the Milk Marketing Board.

manner. A few trials are said to be sufficient for determining the best position of cuff and stethoscope for an individual dog.

Results with such a procedure are stated to agree not only with those of other workers using more elaborate indirect methods, but also with those of direct manometric determinations taken simultaneously from the other femoral artery. For experimental work, the adoption of a definite routine is advocated, since disturbance of a set routine, the presence of strangers, and the occurrence of strange noises, are all stated to cause a rise in blood pressure in some dogs. With these limitations in mind, there seems no obvious reason why the method should not be given a trial in veterinary practice.

A. N. W.

ABSTRACTS

[**The Treatment of Chronic Mastitis during the Dry Period.** Schalm, O. W. (1944.) *J. Amer. vet. med. Ass.* **104.** 78.]

Experiments were carried out to establish the value of a 5 per cent. dispersion of silver oxide in mineral oil in the control of chronic mastitis due to *Str. agalactiae*. Since this preparation was known to be more irritant than tyrothricin or sulphanilamide its use was confined to the dry or nearly dry period, 10 c.c. being injected into each quarter. To avoid local irritation of the teat lining this procedure was always followed by finger massage up the teat to force the oil well up into the secreting tissue. The oil was left in the udder. Fortnightly samples of bulk milk from each animal were taken and examined in order to assess the value of the treatment. If *Str. agalactiae* was found a further injection was given.

Of 162 cows treated in all four quarters 123 calved again before the herd was sold and the experiment finished. Eighty-two (66·6 per cent.) were completely free, of which 76 (61·7 per cent.) had received only one treatment. Figures showed that the percentage of cures fell as the ages of the treated animals increased. Best results were obtained when treatment was carried out from 30 to 60 days before calving and as might be expected, when infection was comparatively recent. Twenty-two cows not cured by the treatment showed a slight drop in butter fat and total milk yield, whilst an increase of both was recorded in 31 recovered animals.

Treatment was followed, in the majority of cases, by a variable degree of oedema and soreness of the udder lasting several days. Some quarters filled with an homogeneous, thick, grey pus which persisted for three to six weeks.

If treatment is carried out at the optimum time the disadvantages referred to are minimised and over a large number of animals, including long-standing cases where induration exists, appreciable success is likely to be achieved.

N. S. B.

* * * * *

[**So-called Entero-toxaemia of Lambs in California.** Britton, J. W., and Cameron, H. S. (1944.) *Cornell Vet.* **34.** 19-29.]

Britton and Cameron attempt a reconciliation of the two divergent views said to be held on the aetiology of so-called infectious entero-toxaemia (Bennetts) following investigations into this condition in good-conditioned lambs in California, associated with an excessive intake of a high quality diet. They regard distension of the rumen, reticulum, caecum and intestines, especially the ileum, as the most striking and significant *post-mortem* lesion. They also state that pulpiness and congestion of the kidneys is "not infrequently found in young lambs immediately after death."

Cl. welchii (type unspecified) was present in the intestinal contents of all cases examined (and in 25 normal lambs). Intestinal filtrate in doses of 2 to 3 c.c. proved toxic on intramuscular inoculation of guinea-pigs in six out of 17 cases, none proving toxic to susceptible lambs on *i/m* injection in doses up to 20 c.c.

The inconsistent presence of bowel toxin, the inability to reproduce the disease in lambs without recourse to a secondary stimulus (induced bowel atony—Bennetts), and the general view that a predisposing cause or condition is necessary in nature, leads the authors to conclude that "the basis for regarding such a condition as an infectious entero-toxaemia due to absorption of *Cl. welchii* Type D toxin is inadequate." On the contrary, they prefer to regard "the quantity and quality of the diet as the chief aetiological factor" and on the strength of the major lesion noted to liken "the mechanism of so-called entero-toxaemia to inhibitory ileus in man."

W. T. R.

* * * * *

[**A Simple Auscultatory Technique for the Estimation of the Blood Pressure of the Dog.** Rule, C. (1944.) *J. Lab. clin. Med.* **29.** 97-98. (Rockefeller Inst. Med. Res., N.Y.).]

The author describes a clinical method for measuring arterial blood pressure in the dog. The device is very simple, and requires only a roll of semi-elastic bandage in addition to an ordinary sphygmomanometer and stethoscope.* The bandage (an "Ace," measuring 9 ft. by 2½ in.) is sewn to the tail of the cloth cover (30 in. by 4 in.) of the sphygmomanometer cuff, and after the cuff has been applied to the dog's thigh, the bandage is wrapped around until every portion of the cuff is covered, and is then secured by a few turns round the body. The diaphragm of the stethoscope is then inserted under the lower edge of the cuff and over the femoral artery. The estimation is then performed in the conventional

* See also Abstract in *Vet. Rec.* (1943.) **55.** 391.

(*Concluded at foot of previous column.*)

Questions and Answers

"Questions and Answers" will be published on alternate weeks.
The submission of questions for inclusion in this column will be welcomed. They can relate to any aspect of veterinary work and where publication of the name of the enquirer is not desired, a pseudonym should be supplied, the name and address also being given.
Answers to readers' queries represent exclusively the personal opinions of the writers, and criticism of the replies will be appreciated.
All communications should be addressed to the Editor.

Optimum Time for Removal of Placenta in the Cow

Q.—*When is the best time to remove the placenta in the cow?*—"*Hesitant.*"

A.—No set rule can be made. Usually about the third day, or earlier if abortion has occurred. It is frequently necessary to leave until the fourth or fifth day if membranes do not separate reasonably easily. The use of drugs such as ergot and stilboestrol helps to preserve uterine tone, but probably has no effect in detaching the placenta membranes, and hypertonic saline douching helps to prevent infection and causes contraction of the uterus. The points to avoid are: (*a*) lacerating the uterus by too early removal; (*b*) removing the maternal cotyledons; (*c*) leaving shreds of placenta attached to the cotyledons; and (*d*) allowing infection to gain entrance and then permitting the cervix to contract before treatment is given.

It should be borne in mind that conditions vary from district to district. On some farms a serious septicaemia appears to develop if the membranes are retained for more than 24 hours; in other areas they may be allowed to "rot away" without undue general symptoms arising. It is always a good plant to irrigate with iodine three to four weeks after treatment.

. . . . . .

Treatment of Mild but Stubborn Pyometra

Q.—*What is an effective method of treating mild but stubborn pyometra cases?*—"*Young Practitioner.*"

A.—Uterine irrigation with iodine, and injection of 30 mg. stilboestrol, followed in 48 to 72 hours by a second irrigation and 10 c.c. pituitrin.

. . . . . .

Prevention of Post-castration Swelling

Q.—*How can the non-infective type of swelling, due to bad drainage, which occurs after castration of colts, be prevented?*—"*Junius.*"

A.—There are three main measures:—

(*a*) The use of the simplest operative technique, *i.e.*, that least damaging to the tissues, *e.g.*, the emasculator.
(*b*) Enlargement of the incision after operation to allow drainage.
(*c*) Adequate exercise immediately after operation.

. . . . . .

Concerning *Demodex Folliculorum*

Q.—(A) *Is there any evidence that the* Demodex folliculorum *is hereditary, or that it may remain dormant in the skin for long periods without causing symptoms?*

(B) *Is it definitely accepted that this mite is not passed from one animal to another?*

(C) *After adequate applications of dressings said to be lethal to this mite, how can one decide—in the event of finding more in the smears—that they have been killed?*

(D) *In view of the frequent sparsity of Demodex found in smears, can it really be accepted that they are responsible for the great skin damage observed in follicular mange, or should this be attributed to their exotoxins (if any) or to secondary invaders?*—"*Dermis.*"

A.—(A) Evidence does exist to suggest that the disease may be hereditary; the writer can cite two instances:—

(1) Chambers records the appearance of demodectic mange in three successive litters of Dalmatians bred from a bitch which never herself showed lesions, outside infection being apparently ruled out.

(2) Hernaman-Johnson, in a private communication, records the occurrence of demodectic mange in a litter of Dachshund puppies, born of a known infected dam but removed from her at birth whilst still enclosed in the foetal membranes, and fostered on to a clinically clean long-coated bitch, all precautions being adopted to prevent extraneous infection. These puppies developed severe demodectic mange, symptoms appearing at 4 weeks of age.

It is not uncommon for a dog to be infected with *Demodex folliculorum* and yet show but the slightest of symptoms; a careful search in such cases will usually reveal suspicious signs, such as bald areas around the hocks, or some paucity of hair on the ears.

(B) No, it is not definitely accepted that infection from one dog to another does not occur. Infection is certainly not comparable with that of sarcoptic mange but prolonged contact, including playing and sleeping together, will frequently produce symptoms in contacts of the smooth-coated, thin-skinned type, although long-coated dogs are usually resistant.

(C) In the writer's view the finding of mites in smears should be regarded as evidence of continued infection. Dead parasites are rapidly cast off by a healthy skin and in any event would disintegrate within a short time of death, so that it is unlikely that typical mites seen in smears have been killed.

Clinically there would appear to be evidence that the mite can acquire a resistance to dressings of various types, so that prolonged dressing with one preparation is less likely to destroy the parasites than frequent changes of application, even if some of those employed are of comparatively low efficiency in this respect.

(D) The usual view as to the lesions observed in demodectic mange, especially of the pustular type, is that these are due to the presence of secondary invaders, frequently staphylococci. So far as the writer is aware, the elaboration of an exotoxin by the parasite has not been proved. Some authorities go so far as to assert that Demodex may be found in scrapings from clinically healthy dogs, and that the recognisable symptoms are consequent upon a lowered resistance on the part of the patient (due possibly to intercurrent disease) and the ensuing secondary infection. The writer does not agree that Demodex may be a normal inhabitant of the canine skin, but readily admits that lesions may be so slight as to escape the notice of all but the most critical observers; this is particularly true of Dachshunds.

. . . . . .

Effects of Ovaro-hysterectomy on the Bitch

Q.—*What are the effects, mental and physical, of an ovaro-hysterectomy performed upon a bitch* (a) *unmated, young or old;* (b) *after having several litters?*—*S. J. Dickson, M.R.C.V.S.*

A.—Young unmated bitches and cats seem to show little deviation, mentally, from entire animals, judging from observation of a very great number upon which the writer has operated. If change occurs, it is to effect an enhanced mildness of manner, to subdue any former aggressive tendency, and possibly to render the animal rather more affectionate. Young animals still remain playful. Physically, there is no detriment to general good health. There is a tendency perhaps to laziness and obesity; oestrus is, of course, abolished and pregnancy impossible.

As regards the second part of the question, it is not often that one is asked to perform the operation, except in cases of caesarian-hysterectomy. In the cases which have been observed, no material changes have been noted other than those which have already been outlined above, especially a tendency to obesity.

Correspondence

Definition of "Freshly Calved Cow"

Sir,—*Re* query in *The Veterinary Record* of July 29th, "How should the term 'freshly calved cow' be defined?"

My answer is: "For the first seven days, but not more than a fortnight under any circumstances."

Yours faithfully,

"Rothiemurchus," J. F. D. Tutt.
St. Cross, Winchester.
August 14th, 1944.

A serious outbreak of mastitis, said to be the worst ever experienced in the area, is reported from North-West Yorkshire. The disease is of a most virulent type and a heavy fall of milk production will result.

* * * * *

Huntingdonshire had about 8,000 dairy cows and it would be far better instead of increasing the number to improve the average yield. That average at present was about 450 gallons a year. It had been estimated that the average for efficiently graded herds in the country was about 700 gallons. If the average production of every cow could be stepped up by even 100 gallons a year there would be no shortage of milk at any time.—F. R. Melvin, W.A.E.C. Livestock Officer.

* * * * *

Professor Roberts, Aberystwyth University, addressing Montgomeryshire farmers at Machynlleth, said Ayrshire cattle had become famous because breeders in Scotland kept milking records and he suggested that breeders of Welsh Blacks should follow this example and make the yields of the breed better known.

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Aug. 30th.—Meeting of the Society of Women Veterinary Surgeons at Birmingham (Grand Hotel), 2.30 p.m.
Sept. 1st.—Special Meeting of the Yorkshire Division, N.V.M.A., at Leeds (Hotel Metropole), 3 p.m.
Sept. 6th.—Meeting of the Association of Veterinary Inspectors, Crewe (Crewe Arms Hotel), 1.45 p.m.
Sept. 6th.—Special Meeting of the Scottish Metropolitan Division, N.V.M.A., at Edinburgh (" Dick " College), 2.15 p.m.
Sept. 8th.—Special Meeting of the Eastern Counties Division N.V.M.A., at Thetford (Bell Hotel), 2 p.m.
Sept. 8th.—Special Meeting of Royal Counties Division, N.V.M.A., at Aylesbury (Bull's Head Hotel), 2.30 p.m.
Oct. 5th and 6th.—N.V.M.A. Annual Meeting and Demonstrations, at York.

* * * * *

N.V.M.A. Annual Meeting

The sixty-second annual general meeting of the Association will be held at the Tempest Anderson Hall, Museum Gardens, York, on October 5th next, and it is proposed to devote the following day (October 6th) to a series of demonstrations, details of which will be notified later.

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PERSONAL

Births.—Douglas.—On August 20th, 1944, to Elizabeth, wife of S. W. Douglas, M.R.C.V.S., Royal Veterinary College, N.W.1—a daughter (Muriel Joyce).

Greatorex.—On August 14th, 1944, at Sunfield, Streatley-on-Thames, Berks., to Margaret (*née* Dymock), wife of John C. Greatorex, M.R.C.V.S., a daughter.

Stuart.—On August 15th, 1944, at Haywards Heath, to Muriel (*née* Taylor), wife of Kenneth Stuart, M.R.C.V.S.—a sister for Ian and Tony.

. . . . .

Forthcoming Marriage.—Gray—Smith.—William Stanway Gray, M.R.C.V.S., to May Myles Kebel Smith, M.A., daughter of the late Lt.-Col. Harry Kebel Smith and Mrs. Kebel Smith, 2, Grosvenor Terrace, Dundee.

. . . . .

Prisoner of War.—The many friends of Mr. John Taylor, M.R.C.V.S., and Mrs. Taylor, of Coatbridge, Lanarkshire, will be relieved to know that their eldest son, Flight-Sergt. William Taylor, R.A.F./V.R., C.M. Forces, formerly reported missing, is now known to be a prisoner of war.

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R.C.V.S. COUNCIL ELECTION: A CORRECTION

It is regretted that in the report of the annual general meeting, R.C.V.S., published in our issue of August 12th, in the section recording the declaration by the President of the elected members of Council (page 297), the names of Major L. P. Pugh and Mr. J. D. Peele were transposed in the list by a clerical error. Major Pugh is elected for the full period of four years and Mr. Peele is elected for the period ending 1945.

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THE LATE MR. JAMES DODD, M.R.C.V.S.

Mr. James Dodd, M.R.C.V.S., of Stephen Street, Sligo, whose death was recorded in our last issue, was a former President of the Veterinary Council of Ireland and a member of that body for many years. Son of the late Mr. Andrew Dodd, merchant, Ballina, he qualified in 1908. Since then he practised in Sligo and became one of the best-known veterinary surgeons in the West of Ireland. He was veterinary inspector to Sligo Corporation and County Council and was one of the promoters of Sligo races as well as a member of the Sligo Show Society. He was a brother of the Very Rev. A. Canon Dodd, P.P., Ballycastle, Mayo.

* * * * *

SPREAD OF FOOT-AND-MOUTH DISEASE

The confirmation of numerous outbreaks of foot-and-mouth disease in widely separated parts of the country led the Ministry of Agriculture, at the end of last week, to issue the following warning:—

Feeding Unboiled Swill Illegal

Outbreaks of foot-and-mouth disease have occurred during the last few weeks in a number of areas in various parts of England, Wales and Scotland. In almost every case the original outbreak of disease has been associated with the use of swill on the farm, the disease first appearing among pigs fed on swill or among cattle on farms where swill was used for feeding pigs. These outbreaks may be attributed to feeding unboiled or improperly boiled swill or else to the communication of infection in some way or other to animals from the swill before it was boiled.

Swill must be rendered safe by boiling before it is fed to animals or before they can have contact with it. It must be boiled on the farm unless it is obtained from any of the authorised plants for the treatment of swill which have been set up in many of the large centres of population. Where possible, the purchase of treated swill is recommended since in that way the risk is avoided of infection being communicated to the animals before the swill has been rendered safe by boiling. No outbreak of the disease has been associated with the use of swill obtained from an authorised treatment plant.

The feeding of unboiled swill or allowing animals access to it or to raw bones or unwashed meat wrappers is a statutory offence. Swill feeders must realise that neglect of these very necessary precautions, involving as it does the risk of a serious spread of disease, constitutes a real menace to the nation's food supplies.

Stock owners, swill feeders and others are also reminded of the importance of reporting immediately any suspicious signs of foot-and-mouth disease among their stock, since early reporting is essential to enable the necessary measures to be taken for preventing the spread of the disease. In particular pig-keepers must regard lameness among their pigs as justifying suspicion of the existence of the disease.

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UNIVERSITY OF LONDON EXAMINATIONS

Following is the July, 1944, Pass List in connection with the First Examination in Veterinary Science (for internal students) held by the University of London: Capel, Leslie Henry; Chandler, Richard Lionel; Darbyshire, James Humphrey.

The following Higher School Candidates have completed exemption from the First Veterinary Science: Appleby, Edwin Calvert; Betty, Ronald Winslade and Pay, Thomas William Ferran.

* * * * *

BOWLS FOR THE V.V.B.F.

After a lapse of five years the Eastern Counties Veterinary Medical Society revived the annual Bowls Tournament for the Shipley Cup in aid of the Victoria Veterinary Benevolent Fund, following the summer general meeting at Bury St. Edmunds on August 15th, when the sum of £12 16s. was raised.

At the kind invitation of Mr. and Mrs. P. Robert Turner, the tournament was played on the lawn amid the delightful surroundings of their charming garden at Risbygate Street, Bury St. Edmunds. The cup was won by Mr. C. H. Downe, of Diss, who beat Mr. E. Brayley Reynolds, of Newmarket, in the final.

Mrs. Turner and Mrs. William Shipley organised a Darts competition in aid of the V.V.B.F. " Ladies' Guild," which raised £3 10s. 6d. The prizes for this competition were presented by Mr. and Mrs. Turner, and included the best bunch of flowers obtainable from their garden.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal views of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

Letters to the Editor should reach the Office not later than by the first post on Monday morning for insertion in following Saturday's issue.

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VETERINARY EDUCATION: THE LOVEDAY REPORT

Sir,—As a mere onlooker, it seems to me a great pity that a profession that has been largely powerless to protect its members for a century should suddenly become filled with jealous bickerings and quarrels when a learned Committee, after long consideration, places before it proposals which are considered by them to be for the benefit of the profession as a whole, and of the British farmer and agriculturalist as well.

Surely to be given protection against unqualified persons is in itself a very great benefit, and worth some sacrifice.

When the first procession of motor cars struggled up Brixton Hill for the run to Brighton, a bevy of students of the period stood laughing at the innovation and assured themselves that the horse would never be eliminated as the chief means of road transport.

I ask members not to let the same mental attitude possess them to-day.

We live in times of great change and progress. Surely the veterinary profession has learned from the competition of all kinds of unqualified persons that our ideas must in these days be tuned to realities. Our sole consideration should be, therefore, not a blind adherence to old-time shibboleths, but the unbiased consideration of the considered judgment of those who, after sincere effort, have issued a report which they honestly believe will ensure not only a brighter future for a small profession, but a certain livelihood for all who are entering it now and hope to enter it in the future.

In the name of progress I ask all members to put aside all personal feelings and prejudices and to unite in securing, at long last, a position for all members that must ultimately be for their benefit and for the benefit of the nation as a whole.

Negotiation and compromise are essential to all social development; surely, therefore, a speedy decision can be made in the matter of the Loveday Report by the display of a reasonable attitude and a little give and take.

Since 30,000 unqualified practitioners can obtain a livelihood from "doctoring" animals, there must be a great future for this small profession of under 4,000, if afforded proper protection—an advantage they have never yet known.

Yours faithfully,

"Woodcote," Pound Hill, MALCOLM PARK.
Crawley, Sussex.

August 15th, 1944.

. . . . . .

Sir,—After a perusal of the two Loveday Reports on the suggested future of the veterinary profession, certain points occur to me which I make in a spirit of friendly comment. It may be presumption on my part as an outsider to address myself to the profession, but it is sometimes an outsider who sees a matter from a different angle, and from such observances some good may result. The profession and animal welfare work are so closely allied, in my opinion, that I can plead, at least that I am no stranger.

The Loveday Reports stress very adequately the need for veterinary education. With this attitude no one can quarrel. If the profession, in my opinion, is to play a leading part in the welfare of the country, through the country's animals, every available opportunity of study should be open and should be taken by future veterinarians. I also think that refresher courses could do no harm. The Government appears to be calling on the veterinary profession from time to time and realising the value of the profession to the health and well-being of the country, but the Government does not seem adequately to reward the profession.

It caused me some concern that amongst all the many witnesses that were called, no representative from an animal charity was examined. Had this course been adopted, it might have resulted in, perhaps, as I have indicated above, a different outlook, but whether that be the case or not, the veterinary profession cannot pursue an isolationist policy towards the charitable side of animal welfare work, and were the profession and the charities to come into closer accord, many of the difficulties which are now apparent would, I feel sure, be dissolved.

The Loveday Report emphasises very strongly the farm and other economic animals; little reference is made to the dog and cat, and little consideration appears to have been given to them. In my submission both the dog and cat are of economic value in many instances, particularly the latter. Were it not for the cat there would be an increase in vermin. The dog is useful on farms for rounding up sheep, and also for the destruction of vermin. From a morale point of view, both these animals help to keep nerves steady, which might otherwise become frayed, although they are sometimes derogatively described as pets.

It may be true to say that some of the public are not as kindly disposed towards the profession as they could be, and, in my opinion, should be, because (*a*) many veterinary surgeons are too busy, or appear to be too busy, to deal with the domestic animals, and (*b*) because some of the establishments from which veterinarians practise are aged and animals going in for one treatment sometimes contract an infectious disease. I think it would not be wrong to say that much of the unqualified practitioners' work arises because the profession appears to be concerned with farm animals. I do not want it to be said that I, in any way, wish the animal of economic value to be neglected for the domestic animal, but I feel that there should be a proper balance.

It would appear to me to be desirable that the veterinary profession should adopt the attitude of its sister profession, medicine, towards voluntary organisations. The medical profession is undoubtedly very closely allied to the voluntary hospitals and takes a deep interest in their welfare and well-being. I am sure that if students could "walk the wards" of the hospitals for animals, they would not only benefit, but this close association would be enhanced.

It caused me some concern to see that in Section 116, on page 82 of the first Loveday Report, no exception was taken to the work of the village castrator. It would seem to me to be fatal to exclude one section of the public performing a cutting operation whatever may be the opinion of castration. It should be, surely, a policy of all or nothing with regard to such forms of veterinary work.

I could find little or nothing in the reports concerning abattoirs and the humane slaughter of animals. This to my mind is a very important subject, as it deals primarily with the comfort of the animal, closely allied with the health of the nation, because I maintain that animals improperly killed cannot be as good food value as animals slaughtered without fear; I, therefore, suggest that the inspection of food animals in markets and slaughterhouses should fall within the venue of the profession.

During the past year or so I have had conversations with various persons and bodies in an attempt to have the inclusion of animals, all animals, in the plans for the reconstruction of this country after the war. I have suggested that more and more inspection is needed of premises of persons on which animals are kept for private gain, and who are not veterinary surgeons, or under the auspices of an animal charity. This would include, of course, all shops at which animals are sold, breeding establishments, as well as farms, breeding kennels and so on. One of my particular concerns is the proper use of in-breeding in animals so that the health and intelligence of the animal is not made to suffer for form or fashion.

Whilst I am in agreement up to a point that country students are preferable as compared with town dwellers, the profession should not rely too largely on one section of the public from which to draw future veterinary surgeons, and new blood infused into any profession must in itself be of advantage.

May I conclude with an apology, but trust that my shortcomings will be overlooked in the belief that the views I express are sincere.

Yours faithfully.

E. KEITH ROBINSON,
Secretary.

Our Dumb Friends' League,
Grosvenor Gardens House,
Victoria, London, S.W.1.

August 11th, 1944.

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Parasitic Mange*	Sheep Scab	Swine Fever
July 16th to 31st, 1944 ...	5	2	—	—	47
Corresponding period in—					
1943 ...	11	—	—	3	28
1942 ...	12	37	—	—	18
1941 ...	8	—	2	2	33
Total Jan. 1st to July 31, 1944	118	29	6	61	518
Corresponding period in—					
1943 ...	182	10	6	104	309
1942 ...	200	111	26	118	265
1941 ...	290	257	12	139	857

NOTE.—The figures for the current year are approximate only.
* Excluding outbreaks in Army Horses.

Tuberculosis (Attested Herds) Schemes

The number of Attested Herds, *i.e.*, herds officially certified as free from Tuberculosis as at July 31st, 1944, was as follows:—

ENGLAND	WALES	SCOTLAND	TOTAL (GREAT BRITAIN)
4,159	8,543	3,778	16,480